Quality Assurance Program Plan for the

"Bucket Brigade" Community Air Sampling Pilot Project

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The Bucket Brigades are a collaborative project of:

Contra Costa Health Services Director's Office,
Contra Costa Health Services Hazardous Materials Division,
Communities for a Better Environment (San Francisco),
West County Toxics Coalition (West County),
People Do! (Richmond),
Healthy Neighborhoods Project (West County)
Rodeo Citizen's Association,
Shoreline Environmental Association (West County),
Communities for a Safe Environment (Martinez), and
Community Abatement of Pollution – Industrial Toxins (CAP-IT, East County)

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The contents of this plan, excepting appendices, will also be distributed to the Bucket Brigade Working Group:

Henry Clark, West County Toxics Coalition
Sarah Eeles, People Do!
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Richmond area: Sarah Eeles
Crockett/Rodeo area: Sandra Dare, Shoreline Environmental Association
Martinez/N. Concord/Clyde area: To be determined
East County: Paulette Lagana, CAP-IT

A. Project Description

1. Project/Task Organization

The attached organizational chart (see appendices) shows the Bucket Brigade's organization. The Bucket Brigade Working Group is responsible for all project decision-making, delegating implementation to various project members. Project member responsibilities are described below. This quality assurance project plan refers to the initial implementation of the Bucket Brigade idea, referred to as the "pilot project" stage. The project goals and intended data uses are circumscribed in this pilot project stage (see below). If and when the Bucket Brigade Working Group decides to expand the scope of the project, this quality assurance plan may require revision.

2. History and Background Data

There are four major oil refineries and many large industrial facilities located along the San Francisco Bay in Contra Costa County. Major accidents from these facilities have heightened community concerns about air pollution from both accidental and permitted releases. Community residents are concerned both about the direct human health impacts of pollution exposure and about their ability to get high-quality and timely information about that exposure. To address these concerns, some residents have formed "Bucket Brigades" to do air toxics sampling. Community members sample during industrial releases − for example, during a fire or other visible release, or when they smell an odor that is not momentary and that they believe originates from an industrial source.

During 1995, community groups in Crockett and Rodeo, with the assistance of a local lawyer, started the Bucket Brigades. With the assistance of Communities for a Better Environment, the project spread to Martinez and Richmond. Sampling experience during this period has often shown post-incident concentrations of various compounds at levels on the order of 1 – 100 ppb. Toluene is the most common compound detected in our samples, appearing at levels on the order of 10-100 ppb after spills and refinery fires in the Bay Area. Prior experience and reports from other agencies suggest that toluene may be a common contaminant of Tedlar bag samples - this question will be explored in the project's quality assurance procedures. Post-incident samples have also routinely detected other compounds such as benzene, acetone, carbon disulfide, hydrogen sulfide, MTBE, xylenes, styrene, carbon tetrachloride, chloromethane, and methylene chloride (at levels ranging from sub ppb levels to concentrations on the order of 10 ppb, occasionally on the order of 100 ppb).

Background levels of VOCs present in the Bay Area range from 2.0 ppb to the level-of-detection for those compounds (BAAQMD Toxic Air Contamination Control Program Annual Report, 1994). For example, these background levels show toluene at 2.0 ppb on average for the entire Bay Area. However, the BAAQMD's monitoring study design deliberately sites monitoring stations in mostly residential communities that are not adjacent to industrial areas. To more accurately assess background levels in residential communities that *are* adjacent to industrial areas, it will be necessary to develop additional background data.

3. Project Description

a. Partner Roles

The "Bucket Brigade" includes volunteer members in three jobs: Sniffers, Samplers, and Community Bucket Coordinators (CBCs). "Sniffers" are responsible for alerting the bucket brigade samplers when they notice a pollution incident. "Samplers" are community members who keep the air sampling devices in their homes and take a sample when they suspect a pollution incident. After taking a sample, the sampler will call a "Community Bucket Coordinator" (CBC). The CBC will retrieve the sampling bag and arrange for delivery to the analytical laboratory. Each of these project members will receive training, as described below. Recruiting flyers for each role are included in the appendices.

b. Project Goals and Intended Data Uses

Overall project goals include:

- Provide the community and the County with more information about chemicals in the air than is currently available.
- Increase public confidence in information about emissions during refinery and chemical plant incidents,

and in the Health Services Department's efforts to protect the public from hazardous materials exposures.
- Build a partnership between the community and the Health Services Department.
- Evaluate the sampling technology and the overall project design, including the County-community partnership at its center.
- Evaluate whether results of the monitoring are useful for policy initiatives that could contribute to public education and reduction of incidents.
- Increase the number of people and organizations involved in conducting air monitoring to complement and build upon existing government and industry monitoring efforts.
- Encourage government agencies to expand their existing monitoring efforts, both of ambient pollution levels and of levels during industrial incidents.

This project intends that analytical results will be used for public information purposes only. This limited scope of use is motivated in large part by the experimental nature of the project design. The major intended use is to provide public information to allow community members to request further and more thorough investigations. Results will be communicated through the local media, community meetings, and other methods for distributing information at a neighborhood level. The project expects that community members will use this data at their own discretion, making follow-up requests with community groups, government agencies and facilities on the basis of this data and drawing on other sources for information about the health effects of pollution levels. The project does not intend to use the data for any regulatory, medical, or legal uses for the duration of the pilot project.

One of the goals of the pilot project is to evaluate potential expansion of the intended data uses. If such expansion is indicated, the project will review quality assurance procedures accordingly.

4. Monitoring Planning Process

Compounds of concern were identified by community members during their past experience with pollution releases from industrial facilities. These compounds include aromatic hydrocarbons, sulfur compounds, and a broad array of other air toxics, all of which can be measured in this project. Several other commonly-released compounds from these facilities will not be covered by this project. These include particulate matter, some combustion by products, and metal refinery catalysts.

a. Sampler Criteria

Because this is a volunteer monitoring project, it is necessary to combine criteria for sampling device locations with criteria for volunteer characteristics. A primary criterion is that the "sampler" must live or work in a location that often receives emissions and odors from an industrial facility. Project personnel have examined maps indicating industrial facilities and volunteers' addresses, along with knowledge of the prevailing wind direction, to qualify volunteers for the project. The project area includes areas adjacent to significant industrial facilities in Contra Costa County. This area approximately includes the populated areas west of Interstate 80 or north of Highway 4 in the county. In some areas, the project area extends beyond those highways. Other desired characteristics include:

- Is home often, usually in town, reachable by telephone, and/or will return messages
- Is willing to stand outside and activate the bucket in case of an industrial incident (however, the project also emphasizes that community members should stay inside if a "Shelter-in-Place" announcement has been made, and that the "Shelter-in-Place" recommendation takes precedence over Bucket Brigade efforts)
- Can take a sample immediately when an incident occurs
- Has a car and, if necessary, may be willing to drive across town to take a sample
- Will attend Bucket Brigade trainings (required)

b. Choice of Sampling and Analysis Technology

The project chose its sampling technique based on the known compounds of concern and prior familiarity with one particular technology: Tedlar bag-based air sampling. Analysis techniques were similarly chosen based on prior familiarity with analysis results for volatile organic and reduced-sulfur compounds.

Prior sampling experience has suggested that the most desirable option for analysis is to obtain the lowest level of detection possible. Known background levels are < 3 ppb for all compounds, <1 ppb for most compounds. Past experience has shown post-incident concentrations in the 1 - 100 ppb range. This project wants to obtain results that are accurate at the parts-per-billion (ppb) level. Since the majority of prior sampling data falls below 10 ppb, the

project hopes to get as accurate resolution as possible.

Tedlar bag based sampling, combined with TO-14 analyses (for volatile organics) and either EPA Method 16 or ASTM D-5504 (for reduced sulfur compounds) provides the optimum balance of wide coverage of compounds, low detection levels, and affordable analyses.

5. Documentation and Records

After each sample, the sampler will record relevant information on a Sampler's Data Sheet and fill out a Chain of Custody Record (see appendices). Relevant information includes the date, time, and location of sampling, the reason for taking the sample, and observations about weather conditions and other local conditions. The analytical laboratory will provide analytical results (see appendices for example). The project will establish a database to record results and facilitate comparisons between incidents, or between incidents and background levels.

B. Measurement (Post-Incident and Quality Assurance Analyses)

1. Air Sampling Hardware

Air sampling hardware consists of two devices − a "bucket" and a "suitcase." Both devices include a rigid plastic enclosure, within which plumbing leads to a Tedlar sampling bag. A simple vacuum draws air from the inside of the enclosure, creating a vacuum inside the enclosure and drawing air into the Tedlar sampling bag. Sampled air does not come into contact with the sampling vacuum, only passing through a small amount of plumbing before entering the sampling bag.

One device, the "bucket" for which the project has been named, is constructed of a five-gallon plastic bucket with stainless steel plumbing. Several of these devices have previously been constructed and have been used by community members. A second device, called a "suitcase", is constructed of a pelican box to which non-metal plumbing is attached. These "Vac-U Chambers" are manufactured and distributed by SKC-West, the Fullerton, CA, branch of Pennsylvania-based SKC Inc. Product information is included in the appendices.

The project will use Tedlar sampling bags, outfitted with polypropylene valves and purged with lab-grade nitrogen before delivery. The vacuum pump is a Radio Shack Enervac electronics vacuum.

Sampling devices will be quality-checked before being put into service. Quality-checking will consist of testing whether assembly was completed properly, whether the device properly fills a sample bag in the expected time, and whether the device leaks under negative pressure.

2. Receipt and Storage of Devices

All Tedlar sampling bags will be purged three times with research-grade nitrogen (grade 5.5) before installation in a sampling device. Nitrogen-purging will either be completed by the county Hazardous Materials Division or by a laboratory expected to perform the analyses − in most cases this will be Air Toxics Ltd in Folsom, CA. Nitrogen-purging removes trace contamination remaining from the manufacturing process.

Sampling devices, equipped with an open and prepared sampling bag, will be provided to volunteer members ("samplers") of the project. The project will provide training in the proper storage of these devices. This training will specify that devices should be kept in a clean location, away from combustion sources and other potential sources of contamination. The training will also instruct participants not to open their sampling devices without assistance from a CBC or county staff.

In addition, this project will also conduct a pilot study to check on the potential for contamination and permeation during storage (See Section B5a, below).

3. Sample-Taking and Delivery to Laboratory

The project will provide training to every sampler in proper operation of the device. This training will specify a protocol for when and where to take a sample, how to operate the device, and how to document proper operating

procedures. These instructions are included in the appendices. Key points of this protocol include the following:

- Make sure your sampling area is away from other sources of contamination.
- Start the vacuum before opening the valve or removing the inlet port plug.
- Run the vacuum for 2-3 minutes, or until bag is half full.
- Close the valve or replace the inlet port plug before turning off the vacuum.
- Record all relevant information on the Sampler's Data Sheet (SDS) and the Chain of Custody (CoC) form.
- Call the Community Bucket Coordinator (CBC).
- Remember that the laboratory needs to receives the sample in enough time to complete analysis (within 24 hours for reduced sulfur analyses, 72 hours for volatile organics, or TO-14, analyses).
- Keep the sampling device in a cool dark clean place until the CBC arrives.

After taking a sample, the sampler will call the Community Bucket Coordinator (CBC) for his or her town. As long as it is safe to venture outside, the CBC will travel to the location where the sampling took place. The CBC will be a paid community member who will receive training in air sampling techniques and quality assurance procedures, including more detailed information about the purpose of these procedures. County and CBE staff shall serve as backup to CBCs where needed.

The CBC's protocol is included in the appendices. For bag removal, key points of this protocol include the following:

- Interview the sampler to check that he/she has completed operating instructions properly.
- Check that sampler has completed SDS and CoC forms properly. Ask additional questions to complete the form, if needed.
- Have Sampler sign the SDS and CoC forms to relinquish the sampling bag to the CBC, and sign the form to accept the bag.
- Include a unique sample number on the SDS and CoC forms, using the format described below.
- Open the sampling device and check for under/over-inflation.
- Close valve on sampling bag.
- Check integrity of bag (check for holes).
- Remove bag from device.
- Perform a visual inspection of the sampling device; check rubber seal, vacuum, general cleanliness, and test that vacuum works as expected.
- Install a new sampling bag in the sampling device.

For mailing the sampling bag to the analytical laboratory, key points of the CBC protocol include the following:

- Coordinate with county staff regarding to which laboratory to deliver the sample.
- Request overnight or courier service if necessary (ground transport only).
- Insure that the laboratory receives the sample in enough time to complete analysis (within 24 hours for reduced sulfur analyses, 72 hours for volatile organics, or TO-14, analyses).
- Place the bag in an approved shipping container.
- Sign the CoC form to relinquish the sampling bag to the overnight/courier service (or directly to the laboratory, if the CBC delivers the bag to the laboratory).
- Send copies of SDS and CoC forms to county staff.

Sample Numbering

Sample numbers shall follow the following format: XXX-YYMMDD-Z, where XXX is the number of the sampling device, YY is the year, MM is the month, DD is the day, and Z is an arbitrary number. Duplicates, split samples, or other situations where the same device creates more than one sample in a given day shall be distinguished by using different values for the number Z. In all cases the same sample number should be written on both the SDS and CoC forms. Sample numbering examples:

202-980723-3	Sampler #202, taken on July 23, 1998,
202-980723-5	Sampler #202, taken on July 23, 1998, split sample
315-980818-1	Sampler #315, taken on August 18, 1998

4. Laboratory Analytical Methods

The project will only use analytical laboratories that follow EPA reference document guidelines for volatile organic

gas (EPA TO-14 or TO-15) and sulfur gas (Method 16 or ASTM D-5504) analyses. To date, potential laboratories include Air Toxics Ltd, Performance Analytical Inc., and the EPA air toxics laboratory in Richmond. See appendices for standard operating procedures and a quality assurance plan from Air Toxics Ltd.

The project will also request that the EPA Region IX Quality Assurance Division perform a laboratory audit or report the results of a recent audit, for the analytical laboratory.

5. Quality Control Analyses

In addition to the quality assurance procedures to be followed during device commissioning and storage and post-incident sampling and analysis, there are also important quality assurance procedures that must be followed on a less frequent basis. For detail on the use of these analyses for data review, see Data Review (section C1).

a. Pilot Study

Because of concerns of contamination and permeation of Tedlar sampling bags during long-term storage, this project is conducting a pilot study into storage contamination. This study includes four analyses (VOCs and sulfur) of sampling bags, stored in sampling devices over a period of up to 8 months. Results of this study will be used to guide technology choices and data review procedures. The term "pilot study" refers only to this investigation of storage contamination. Note that the term "pilot project" (see section A1) refers to the entire Bucket Brigade project as currently envisioned.

b. Field Duplicates

To check contamination in field methods and the consistency of laboratory analyses, the project will include periodic field duplicates. For a field duplicate, a sampler will take two samples at once, using separate devices, in a circumstance in which he/she would normally take a single sample. The two bags will be labeled so as to disguise this similarity from the laboratory and the bags will be delivered to the laboratory in the normal fashion. Where possible, field duplicates will be collected during post-incident sampling. However, because of the unpredictable and sporadic timing of pollution releases, these duplicates may not be taken in exactly the same manner as post-incident samples. Instead, they may be taken on a pre-planned basis, for background samples or another pre-planned event.

The project will include quarterly field duplicates, or about one duplicate for every 7.5 post-incident samples (at the expected 30 samples/year rate).

c. Field Blanks

To check for contamination in field methods and the consistency of laboratory analyses, the project will include periodic field blanks. Field blanks may be collected in one of two ways. The first way will be to store a second sampling device in a sampler's house, along with her or his standard device. If an incident occurs, the sampler will take a sample as usual with one of the devices but do nothing with the second device. The second way will be to take a sampling bag from a different sampler (not the one performing the analysis). In either case, when the CBC arrives to retrieve the sampling bag, she/he will fill the second bag with lab-grade nitrogen (either at the sampling location or in the CCHS laboratory). The two bags will be labeled so as to disguise this difference from the laboratory and the bags will be delivered to the laboratory in the normal fashion.

This process will be guided by the Quality Assurance personnel's professional judgment, balancing logistical concerns with the effort to maximize the similarity between the handling of field blanks and actual samples. Choosing the samplers and coordinators to be responsible for field blanks will be done on a more or less random basis, with the requirement that different samplers and different coordinators have the responsibility over the course of the project.

The project will include quarterly field blanks, or about one field blank for every 7.5 post-incident samples (at the expected 30 samples/year rate).

d. Performance Certification

The project will use assistance from the EPA Region IX's air toxics laboratory ("the Richmond lab") to allow

performance certification analyses. At least once during the duration of the project, the project will ask the Richmond lab personnel to fill a Tedlar bag with a known set of compounds at known concentrations. This performance certification sample will be labeled so as to disguise this difference from the laboratory and delivered to the laboratory in the normal fashion. See appendices for letters between project personnel and the Richmond lab detailing the lab's offer of laboratory services.

The project will include at least one performance certification analysis during the first year of the project.

e. Split Samples

With the assistance of the EPA Region IX's air toxics laboratory, the project will also conduct split samples on some post-incident analyses. For a split sample, the Community Bucket Coordinator will deliver a Tedlar bag directly to the Richmond lab. The Richmond lab will draw a partial sample from the bag and forward it to the independent analytical laboratory. These split samples may be analyzed on a pre-planned basis, for background samples, the performance certification, or another pre-planned event. See appendices for letters between project personnel and the Richmond lab detailing the lab's offer of laboratory services.

The project will conduct split samples at least once during the first year of the project.

f. Comparative Testing and Background Characterization

With the assistance of the EPA Region IX's air toxics laboratory, the project will also contribute to the state of knowledge about the comparative validity of different sampling techniques and technologies. Comparative testing will include side-by-side samples taken by several different devices, including community-built "buckets", manufactured "suitcases", and Silco-steel lined Summa canisters. These comparative tests will be taken on a pre-planned basis, for background samples or another pre-planned event.

The Richmond lab has offered to complete 4 analyses per month during the first year of the project.

6. Additional Data Sources

The project will also seek additional data sources for information on background pollution levels in the community. Existing monitoring stations operated by the Bay Area Air Quality Management District and the California Air Resources Board do not cover industrial areas of the county, the service area of this project. The project will investigate whether there are any other existing data from industrial facilities or government agencies. In addition, project members will investigate the possibility of generating background data from other sources.

C. Assessment

1. Data Review

a. Sample Results Data Review Process

If the pilot study, lab method blanks, field blanks, split samples, or comparative testing shows systematic contamination, project members will either conduct follow-up studies to determine the source of contamination or revise data review procedures to note potential contamination. For example, if field blanks consistently show toluene contamination, the project may establish a "contamination level" to be used as described below.

Quality assurance personnel will review performance certification and split sample data to determine the need for a laboratory audit, additional performance certifications, or other assistance. This review will be based on the criteria described below. If these results indicate potential laboratory performance concerns, the project will submit a request to the EPA Project Officer for assistance from the EPA Region IX Quality Assurance section.

When post-incident sample results are delivered to Contra Costa Health Services by the analytical laboratory, CCHS personnel will review post-incident samples to inform public distribution of analytical results. Data will be reviewed based on data review guidance similar to the EPA Region IX "RCRA Corrective Action Program Data Review Guidance Manual." Review will consist of the following:

- Review Sampler's Data Sheet and Chain of Custody Record: Were the forms completed properly? Were sample collection procedures followed correctly? Do the forms adequately indicate the time, date, and

location of sample collection, and include a sample number? If there are any problems, communicate them to the appropriate Community Bucket Coordinator and/or Sampler.
- Check if field blanks, field duplicates, split samples, or a performance certification were submitted and completed. See above (section C1a) for specific review procedures on these types of analyses.
- Review laboratory results: Check if method blanks or laboratory duplicates were completed. Check whether the correct analysis method was used, the correct list of analytes was reported, and if detection limits meet project requirements. If there is a problem, resolve the issue with the laboratory conducting the analysis.
- Attach data flags to results as appropriate (see section C1c below); generate paragraph summarizing results; attach to sampling results, and disseminate reviewed data to project members (see section C2, below).

b. Review and Flagging Criteria

Lab Method Blanks and Field Blanks

If the blank shows a level above the detection limit and if the associated sample result is less than 5x the level seen in the blank, the sample result will list a "B" next to the result to indicate contamination in the blank. Note that if the blank shows non-detect for any given compound, no "B" flag will be attached.

Field Duplicates and Split Samples

Reviewers shall calculate the relative percent difference (RPD) between the pair of results for each compound (note that the RPD cannot be calculated if one of the results is a non-detect). The RPD is calculated from the following formula:

$$\text{RPD} = \frac{\text{Result \#1} - \text{Result \#2}}{\text{Mean of Results \#1 \& \#2}} \quad \text{(expressed in \%)}$$

Where both results are at least 5x the detection limit, an RPD > 50% indicates a need to investigate the source of the error. Precision near the detection limit is often inherently poor due to instrument limitations; therefore, where the results are less than 5x the detection limit, project QA personnel will exercise professional judgment as to whether there is a problem.

In either case, if results indicate the need for further investigation, each associated sample result will list a "X" to indicate that the analyte was positively identified but that the numerical concentration reported is an estimate because of data uncertainties.

Performance Certification

Performance certification samples will be prepared with all compounds at 5x the detection limit or higher. For all performance certification results, reviewers shall calculate the recovery percentage (%R) from the following formula:

$$\%R = \frac{\text{Analyzed Result} - \text{Actual Concentration}}{\text{Actual Concentration}} \quad \text{(expressed in \%)}$$

A %R outside of the 70-130% range indicates the need to investigate the source of the error.

Common Contaminants

Existing experience with Tedlar-bag based sampling suggests that there may be problems with permeation of sampling bags or manufacturing residues, particularly in a situation where the bags are stored for long periods of time before being used. The Pilot Study (see above) will investigate this concern and ongoing experience with field blanks may provide additional information.

If the sample analysis shows a level less than 5x greater than the previously established contamination level for a common contaminant (see above), that result will list a "Y" next to it to indicate that the result may be due to sample contamination.

Summary of Project Data Flags

"B"	Analyte was present in a lab or field blank at a level that may have contaminated sample results
"X"	Analyte was positively identified in laboratory results but numerical concentration is an estimate due to discrepancies in split samples or field duplicates
"Y"	Analyte was positively identified in laboratory results but previous experience shows this analyte to be a common contaminant, and sample results at a level that may be due to this contamination

Laboratory Flags

The analytical laboratory used for this project has its own definitions for its data flags (see "Laboratory Quality Assurance Plan", Air Toxics Ltd, in appendices, p. 74). Where these flags do not conflict with the data review procedures described above, the laboratory's flags will be retained for data distribution.

2. Assessment and Response Actions

For post-incident analyses, project QA officers will forward data to all appropriate project members after data review (see "Responding to an Incident...." flyer, appendices). Forwarded data will include quality assurance information, including at least data flags and a brief narrative description of the sample results. This quality assurance information will not include any information about potential health risks or commentary about the significance of these results.

The project expects that community members and project members will use this data at their own discretion, making follow-up requests with community groups, government agencies and facilities on the basis of this data and drawing on other sources for information about the health effects of pollution levels. The project does not intend to use the data for any regulatory, medical, or legal uses for the duration of the pilot project.

This project will also include community education to provide information about the potential health effects of reported pollution levels. This information may include fact sheets about specific chemicals, information about background levels, known health effects, regulatory levels, trends of specific compounds over time, quality assurance information, and the results of the latest group of samples.

D. References

"EPA Guidance for Quality Assurance Project Plans" (EPA QA/G-5), US EPA Office of Research and Development, Quality Assurance Division (8724R), August 1997.

"RCRA Corrective Action Data Review Guidance Manual", US EPA Region IX, US EPA Region IX RCRA Corrective Action Data Validation QAT Members, July 1995.

"Volunteer Monitor's Guide to Quality Assurance Project Plans" (EPA 841-B-96-003), US EPA Office of Wetlands, Oceans and Watersheds (4503F), September 1996.

APPENDICES

Bucket Brigade Organizational Chart

Sniffer's Recruiting & How-To Sheet

Sampler's Recruiting Sheet

How to Take an Air Sample - training instructions for Samplers

Community Bucket Coordinators Recruiting Sheet and "Responding to an Incident...." flyer

Instructions for Community Bucket Coordinators, or "How to Get Your Sample Analyzed"

Sampler's Data Sheet and sample Chain of Custody Record (original supplied by Air Toxics, Ltd)

Sample of Analytical Results – Air Toxics, Ltd.

"How to Make a Bucket" – excerpted from Communities for a Better Environment, *The Bucket Brigade Manual, 2nd edition*, Spring 1998

Manufacturer's information on "Vac-U Chamber"

Letter from Schuyler Fishman, CBE, and Jeff Hobson, CCHS to Brenda Bettencourt, Lab Director, EPA Region IX, June 1, 1998
Responding letter from Brenda Bettencourt to Schuyler Fishman and Jeff Hobson, June 26, 1998

Laboratory Quality Assurance Plan for Air Toxics Ltd.

Standard Operating Procedures for EPA Method TO-14, for Air Toxics Ltd.

Standard Operating Procedures for ASTM Method D-5504 (Reduced Sulfur), for Air Toxics Ltd.